Report

Cattle Disease

IN THE

CENTRAL PROVINCES.

The following report has been prepared at the desire of the Administration of the Central Provinces and is mainly based on information which has been placed at my disposal by Government. This information principally consists of the notes of three Hospital Assistants who were in April 1884 placed on special duty in order to make an enquiry into the forms of cattle disease which prevailed in different parts of these Provinces, the mortality which resulted from them, and the preventive measures which were adopted by the people. Their enquiries extended over eleven of the eighteen districts included in the Provinces, viz., Saugor, Jabalpur, Hoshangabad, Nimar, Wardha, Nagpur, Chanda, Bhandara, Balaghat, Raipur and Bilaspur, and covered therefore an area which may be considered representative of the Provinces. In making their investigations they followed a definite system and their notes were all drawn up on a uniform plan consisting of—

(1). A register showing the general results of the enquiry made by them village by village.

(2). A district summary including—

(*a*), a list of the principal cattle diseases prevailing, with their vernacular names and a description of their most striking symptoms,

(*b*), a description of the food which the cattle of the district received,

(*c*). an account of the persons locally practising as cattle doctors.

(3). A detailed account of each severe disease occurring in the district, noting

(*a*), its symptoms as described by the people,

(*b*), the years in which it had recently attacked cattle and the mortality which it occasioned,

(c), the treatment or remedies used by the people for it.

These reports were not altogether satisfactory. The extent of country to be traversed was too large and the time allotted was too short to admit of detailed enquiries, nor had the investigators sufficient knowledge to direct them. Altogether it cannot be said that the reports give more than a very rough idea of the extent to which epidemics visit the cattle of the Provinces and of the amount of loss which results from them. Still they contain much useful information, particularly the ones drawn up by Hospital Assistant Daji Ramchandar.

There have also been placed at my disposal two reports on cattle disease written by Civil Surgeons in these Provinces, one by Dr. Kidd of the Mandla, and the other by Dr. Cullen of the Nimar district. From both I have obtained much assistance, and I am particularly indebted to Dr. Kidd's report for many of the facts now mentioned by me.

I may be permitted to add here that my own experience of cattle disease has been of service to me in compiling this report. The subject is one to which I have paid special attention, and I was for six months Lecturer on Cattle Hygiene and Disease at the Madras Agricultural College.

The present report has been thrown into two parts. Part I. deals in the main with general questions common to all cattle diseases. Part II. deals with each form of cattle disease particularly and separately.

The order in which the subjects of each Part have been arranged is as follows :—

PART I.	PART II.
Brief account of the principal cattle diseases prevailing, noting the districts in which most common.	(Of each principal disease.)
General causes of cattle disease and steps taken by the people to obviate them.	English and Vernacular names.
General means of prevention and cure.	Nature and symptoms.
Cattle food in different parts of the Provinces.	Pathology and *post mortem* appearances.
	Native treatment.
	Treatment recommended.

PART I.

The principal cattle diseases prevailing in the Provinces.

The diseases which attack cattle in these Provinces in epidemic form are Rinderpest, Anthrax (or Ludhiana fever) in its several forms, Pleuropneumonia and Epizootic Aptha or Foot and Mouth disease. The reports show that all four diseases occur with tolerable frequency throughout the Provinces, although some tracts suffer from them much more severely than others.

Rinderpest—is the most fatal of all the four diseases mentioned. It has spread throughout the Provinces and destroys thousands of animals annually. By the reports before me it seems that the disorder is most prevalent in Raipur and Bilaspur. Hoshangabad and Saugor are also much afflicted with these epidemics. But it appears that the disease is always present in one locality or another. In some places the disorder is said to spread between the months of March and July : at others it is said to affect animals more severely from June to October, and at places again people say the disease comes in its most virulent form in the cold weather. We must from these statements conclude that the disease is present throughout the year. The Nagpur tract of country seems to have been the one least affected.

Pleuropneumonia.—Although many animals are destroyed by it annually it is not very contagious, but by the papers before me I find that it is very virulent. Upwards of 80 per cent of the cattle affected die. At Khandwa, in the Nimar district, the disease is said to appear yearly, and in Burhanpur, in 1883 and 1884, the disease was particularly destructive. The Saugor-Narbada tract seems to have had the largest losses from pleuropneumonia, while Chanda and Balaghat may be said to have been entirely free. I cannot account for this fact unless it is that the contagious germs have not yet been carried there or that some component of the soil is antagonistic to its life and propagation.

Raipur and Bilaspur are frequently visited with this disease as with others of equally violent nature.

Anthrax (or Ludhiana fever) in its different forms attacks animals of all kinds and condition and in all parts of the Provinces; but in no part is it more virulent than in Raipur and Bilaspur. These two districts, according to the reports, are very hot beds of contagion. The disease is known variously under the names of Chhai or Chitrojh, Sonai and Lohadia and it destroys thousands of animals. In no other districts is this disease so contagious. This, I think, is due to the moisture of the soil. In such a locality the germ or bacterium has all the necessary conditions under which it lives and multiplies, moisture and heat being the most important. I shall have more to say of this hereafter when considering the causes of contagion. The Narbada tract is comparatively free from this disease, at least in epidemic form, particularly Saugor and Jubbulpore. The Nagpur Division also suffers but slightly from this disorder.

Foot and mouth disease—(Epizootic Aptha) is probably more contagious than any of the other four diseases mentioned and certainly more widely spread; but as few or no animals succumb to the affection the people pay little attention to it. Where the affected animals are properly treated and well cared for there are no deaths. Besides which the remedies used by the cultivators are sufficient and good, so that little harm is occasioned except when the plough cattle are attacked and are prevented from doing their usual labour. Epizootic Aptha affects animals in every district throughout the Provinces, and is well known by every cattle owner.

The general causes of the spread of Cattle disease and the steps taken by the people to prevent them.

So far as the *causes* of disease are concerned, present knowledge is very imperfect. All four of the above named diseases are febrile, and the specific causes of fever, as at present understood, are believed to be miasmata which can be thrown into three classes:—

i. Miasmata originating from the natural soil and called marsh miasmata.

ii. Miasmata originating from artificial collections of refuse and decaying vegetable and animal matters, such as drains, cattle litter and waste ground used by the villagers.

iii. Miasmata thrown off from the bodies of cattle labouring under disease. These latter are called contagious miasmata, morbid poisons or disease germs.

It is now well known that countless germs of vegetables and animals exist in the air and develope whenever they find an appropriate nidus. The germs of *Bacterium termo* are in immense abundance. According to Pasteur during their development they produce those chemical changes which have ordinarily been referred to the action of oxygen alone. Some of these infusorial ferments, such as the *Bacteria authracis*, require oxygen for their action. Others again like vibrios develope only when there is no oxygen. In either case all that is required is an organic menstruum, then either one set of ferments or other comes into play and either produces the fermentative changes and morbid condition or invariably accompanies them.

The amount of these germs is in proportion to the impurity of the air. For instance, fermentable liquids change extremely slowly when exposed to pure mountain air, while on the other hand the change is very rapid when exposed to vitiated air.

The custom of leaving dead carcases just outside villages is universally practised in these Provinces, and probably there is no greater source of disease than this. The carcase becomes simply a teaming host of disease germs, which are disseminated throughout the country by dogs, birds, flies and winds. Though it has not been proved in every case that these diseases are due to special organisms, yet it has been found advantageous to adopt the "germ theory" as a basis for working purposes. We may safely do so, for many obscure facts have already been explained by it. Given this supposition, we must then conclude that the organised generators of disease have certain specific characters of form, composition and life conditions. We have then to consider their habitat, products and several changes from the embryonic to the matured state. On some, nay, I may say many, of these points we are quite ignorant. There are many of these organisms that have only quite recently been discovered and many whose existence we can affirm at present only from

reasoning. There is still, however, much to be learnt. But there is every reason to believe that the cattle epidemic diseases which cause so much loss in the Central Provinces are due to minute organisms. They gain admission into the system either through the air or through the food. Water may also be a vehicle by means of which the fungi gain entrance into the circulation.

But given the causes, the liability of cattle to disease from them very greatly depends on the condition in which they are kept. Circumstances which predispose cattle to attack are

1. A too liberal or an insufficient diet.
2. Overcrowding in small sheds.
3. Exposure to the vicissitudes of the climate.
4. Being herded and housed on low lying grounds.
5. Impure water.

These circumstances are all obviously preventable, and most of them with only ordinary care, and but slight expense. But for practical purposes, a knowledge of the ultimate causes of these diseases is not of such importance as a knowledge of the causes which induce the *spread* of a disease once started, that is to say, a knowledge of the conditions which are favourable to the production and spread of the miasmata which are specially classed above as "contagious." Given then cattle which are kept under conditions rendering them liable to disease and given the disease, the immediate causes which are most effective in spreading it are—

Firstly.—The manner in which the carcases of diseased animals are disposed of.

Secondly.—The want of proper segregation of diseased animals.

Thirdly.—The want of restrictions on Banjaras, who are allowed to take diseased cattle along the public roads and into villages.

Fourthly.—The washing and cleaning of skins of animals that have recently died of a contagious disease, such as rinderpest, anthrax, or pleuropneumonia in the pools or watering places of the village cattle.

Throughout the Provinces the above mentioned sources of contagion are commonly present, and apparently little or nothing is done to remove them.

Doctor Kidd, in his report on the outbreak of an epidemic (rinderpest) among cattle in the Mandla district, says,—"Early in March Banjaras came from Khalouti with "diseased cattle to Baranga, where several died; at the same "time some Baiparies went to Babara, where one animal died. "The disease started from these two points.—From Baranga "it has been traced to Amarpur, and from Babara towards "Ramghur, Peeparia and Rampuri."

He further goes on to say that the Malguzars never isolated the stricken cattle. They were all, diseased and healthy, kept in the same sheds, and except giving the animals water and a little grass, nothing was done to remedy the evil; and again the "death rate was very high where water was scarce and only procurable from pools or ponds, and low where the water was obtained from a running stream."

In referring to the "Chamars" or tanners, Doctor Kidd says,—"the water was of course contaminated by the diseased "animals, being watered at the same pool as the healthy ones; "but it was much more polluted by the Chamars, who took the "skins of the dead animals and washed and sank them in these "pools. The high death rate at Baranga was accounted for "in this manner: out of 325 head of cattle 125 died, whilst in "the adjoining village, out of 120 animals 50 were attacked. "20 of these died, and 30 recovered. The Chamars resided at "Baranga and brought the skins from Salagori and Jaladon-"gri to Baranga, and probably from other villages."

The results of the Hospital Assistants' enquiries bear out Doctor Kidd's remarks in showing that very little of any practical use is done by the people themselves in obviating the causes which are most efficacious in spreading disease. Segregation is rarely, if ever, practised, though indications are

not wanting of an appreciation of the benefits which would result from segregation were it possible. But were the inhabitants of a village to enforce the segregation of their own diseased animals, and to rigidly prohibit the Chamars from bringing skins into the village from the outside, they would still be liable to contagion from the visits of cattle from the outside, which they are powerless to prevent. The Banjara traffic would still remain a potent source of contagion.

While granting then that the reports show signs of a certain amount of appreciation of the real causes of disease it must be confessed that they bring out a deplorable amount of ignorance. The most destructive of the four diseases is rinderpest, and this is popularly supposed to be the equivalent of small-pox amongst men, and like it to be directly due to the intervention of the goddess Devi. In her honour the disease is given the name *Mata* (or mother), exactly as the case with small-pox. The remedy for rinderpest most commonly adopted is then the propitiation of Devi. This is effected by taking some of the water in which the goddess is supposed to have bathed, offering it to the idol, and then sprinkling it over the affected animals. An offering of a cocoanut is generally made.

The functions of the cattle doctor are then generally those of the priest or *pujari*. But there are in places men who are believed to understand the cure of diseases and to know of remedies other than religious exercises. Many of these men are probably mere imposters, but certain of them seem to have attained by experience some real skill in cattle treatment, and to be aware of remedies which are of some efficacy. Four of such men are mentioned as being consulted in the Saugor district, three in Jabalpur, four in Hoshangabad, and the same number in Nimar. In the Wardha, Nagpur, Chanda and Bhandara districts no particular classes of persons practise as cattle doctors, but occasionally men of various castes are consulted, since they are supposed to have acquired either special knowledge of disease or special knowledge of the proper remedies, amongst which, however, incantation seems to be the chief. In the Chhattisgarh districts no persons seem to have gained any special reputation as cattle doctors.

Although many of the remedies adopted are, to say the least, quite useless, there are a certain number which are probably beneficial, and these are mentioned in the second part of this report. The treatment of foot and mouth disease reported from the Hoshangabad district may be quoted as a curious instance of superstition mingled with some grains of truth. The animals are made to stand in mud or to walk in hot sand. This is supposed to destroy "the worm"—the maggots which have bred in the sores through careless treatment. If this does not prove successful a mixture is made of bread and the bodies of the small scarlet velvety spiders which abound on the ground in the rains, and the animals are given this to eat. The sores may also be smoked with the fœces of a monkey, the flesh of an alligator, or tiger's fat. In some cases water in which leather has been tanned is sprinkled over the affected parts. Or the scales of a snake may be mixed with bread and administered as a ball.

There may be mentioned here a cause to which disease is sometimes ascribed by the people and which, though it may sound improbable at first, is undoubtedly correct. This is the action of Chamars, who are said to poison cattle for their skins, which are the perquisite of the Chamars of the village. Numerous investigations have proved the truth of this. The poison most commonly used is said to be the milky juice of the Madar (*Calatopis gigantea*). Cotton is soaked in this and then thrust up the anus of the animals, where it produces a violent inflammation resulting in death. The death must be one of horrible torture. Other poisons attributed to the *Chamars* of Chhattisgarh are powdered Kaiphal (*Myrica sapida*), Men-phal (*Randia dumetorum*) and Teoraiya bark (*Ipomoea turpethum*). If a portion of the bark of the Men-phal is thrown into the pond or tank in which the cattle are accustomed to drink the water is supposed to produce giddiness (congestion of the brain) which causes death in from 2 to 3 hours. The reports go on to say that even the animals that are bathing become affected by the power of these drugs. They are said to struggle like fish and die shortly afterwards.

The above supposition is quite without foundation, for the drugs just mentioned are quite harmless, at least

if treated in the manner above described. For instance, Kaiphal is well known to be an aromatic stimulant when given internally and a mild rubifacient if externally applied. Menphal is an emetic and is frequently applied as an anodyne in rheumatism The villagers have probably got their idea from the fact that in some parts of the country Dhimars (fishermen) by powdering the dry fruit and throwing it into ponds where they know there are fish succeed in catching them when they would otherwise fail. For the drug really has the power of intoxicating them. After the Menphal has produced its effects the fish float to the top of the water, nor are they less wholesome to eat afterwards. The Teoraiya is simply a purgative and very much resembling jalap in its effects.

General means of prevention aud cure.

The remedies or treatment most suitable to each of the four diseases will be described in Part II. of this report, and the remarks which follow are of a merely general character concerning the use and manner of effecting segregation, fumigation and inoculation.

Segregation.—This is without doubt the most important measure of any which can be devised to prevent the spread of the disease. Its importance has been in Europe recognized by legislation, and there is much that can be urged in favour of making a certain amount of segregation compulsory in this country, or at all events of giving people legal power during an epidemic to secure their own cattle from the possibility of contagion from infected animals.

Since 1873 the people of Saugor, Hoshangabad, Nimar and Jabalpur seem to have partially recognized the value of segregating the diseased from the healthy animals. At the commencement of an epedimic a few of the first cases are separated from the others; but if the disorder happens to spread among the herd the people then disregard all caution and allow the healthy and diseased to mix intimately together. No steps are taken to prevent them from eating and drinking together. When a contagious disease is known to have appeared in the neighbourhood no cattle ought to be

taken near the affected locality for grazing purposes. Nor should any cattle be permitted to leave the affected ground *under any pretence whatsoever*. In cases of this kind legislative aid would be of the very greatest help. If possible a cordon should be placed around the village in which the disease occurred, thus to try and minimise the spread of the contagion.

During an epidemic of cattle disease all sick animals ought to be isolated from the rest and kept for 7 or 14 days under observation. In the case of animals dying it is imperative that the carcases should be buried or burnt. The expense necessary for the latter mode would probably deter or altogether disincline the ryots from using fire, but with the former only manual labour would be expended, and surely the saving of many valuable cattle would amply compensate them for the two or three hours' work required.

In every village a small space of waste ground ought to be fenced round for the reception of animals affected with rinderpest, anthrax, or pleuropneumonia. The animals should be treated in the manner herein advised and every care should be taken for their comfort, as by giving them soft and nutritious food, clean straw and fresh wholesome water. Good nursing is of the greatest importance in febrile and debilitating diseases.

Before leaving this enclosure the animals ought to be thoroughly washed and fumigated so that they may not spread the disease among the healthy herds.

Fumigation is a very excellent preventive measure combining as it does simplicity with cheapness. The manner for carrying out fumigation is very simple and may be performed thus:—

Put a number of animals in a shed fitted with doors. Place a chatty of burning charcoal in the centre of the floor. Throw a handful of sulphur, common in most bazars, on the burning coals, quickly go out and take great care that the room is fairly well closed. The cattle may be left in the room from 20 to 30 minutes, when another lot can take their place, and so on until the whole herd have passed through the

process. Another substance may be used as a still cheaper substitute and obtainable everywhere, *i. e.* green-wood. The process is longer, but will cause less irritation to the sensitive living membrane of the throat and lungs than that of the burning sulphur. The action of the vapour (sulphurous acid) from the burning sulphur is antiseptic. It is also a powerful deodorizer and disinfectant, so also is the carbon from the wood but not quite so effective as the acid. Therefore any germs that may be on the animals at the time of fumigation are at once destroyed, and the blood by being impregnated with a powerful antiseptic becomes less liable to become a habitat for disease fungi.

Inoculation.—Certain diseases are only supposed to attack an animal once; for this reason many experimenters have inoculated animals from a diseased subject, very frequently with fatal results. It was thought that the operation would induce an attack of the disease in a mild form. Sometimes immunity was secured, but the disease as artifically generated proved severe and communicable. M. Pasteur has now succeeded in so cultivating the specific disease germs in fluids that he has been enabled to impart to the subject a mild disorder which acts as a prophylactic against a more severe one. M. Pasteur has so far succeeded in cultivating the Bacteria anthracis that an enormous number of cattle and sheep have been inoculated with most favourable results. In considering the four most contagious diseases separately, I have under the heading of anthrax given a description of the *modus operandi* for injecting the protecting fluids of anthrax.

Nothing is definitely known with regard to the rinderpest contagion. Inoculation has been tried as a preventive measure, but it reproduces the disease in all its fatality and communicability. Vaccination has also been tried, under the impression that small-pox of the human subject was analogous to rinderpest. This was also unsuccessful. When a proper inoculating fluid has been discovered it will be of an inestimable value to herd owners of this country.

What I have stated with regard to rinderpest applies equally to pleuropneumonia. Nothing is known of the infecting fungi. Inoculation has been advocated in England by

many people. It is performed by collecting the serum or watery portion of the blood from the lungs of an animal which has died in the early stage of the disorder. A small portion of it is injected under the skin with a small syringe or shreds of cotton saturated with the fluid are inserted into the tip of the tail. The cotton is removed after a lapse of about 20 hours. In favourable cases a considerable amount of local swelling occurs and frequently extends up the tail, giving rise to violent inflammation of that extremity, which ushers in mortification. When this occurs one or more joints of the tail have to be amputated : considering the danger of the sympathetic febrile symptoms it certainly leaves much room for doubt as to its being a valuable prophylactic.

Cattle food in different parts of the Provinces.

This was one of the subjects to which the Hospital Assistants were directed to pay special attention, and in their reports they make particular reference to it. Judging from what they have written it would seem as if the cattle of the Provinces are on the whole very well fed *when in work*, but it must be remembered that the cattle to which they refer are the *more valuable* working cattle and not the half starved animals, which are only occasionally put to the plough in time of pressure and which are compelled to subsist as best they can on grazing unsupplemented by stall feeding of any kind.

But respecting the treatment which even the more valuable cattle receive, opinions differ greatly. Thus Dr. Cullen in his report on cattle disease in the Nimar district writes:—

"Seeing that the cattle of this district are of rather a "superior kind and fetch good prices, it is astonishing to note "the disregard of the owners. The herds are left to forage "for themselves, and during every hot weather numbers are "lost from *starvation*. They are not housed but penned in "enclosures of rails or thorns and exposed to all weathers." He goes on to say that it is only the working bullocks which are generally well cared for, housed and properly fed, and it is only when these animals are attacked with disease that the owner will seek medical treatment.

The accounts of the Hospital Assistants are abstracted below:—

Saugor District.—During the rains a valuable pair of bullocks receives daily three sers of gram, two sers of khalli (linseed cake) two bundles of green grass, and a basketful of wheat husk. If they have had a hard day's work the following "sani" or mash is given to them. It is prepared with oil cake and wheat husk: Two sers of the cake are soaked in about four sers of water for four hours. This is then poured into a basketful of wheat husk and thoroughly mixed, sometimes two sers of cotton seeds are added to the mixture. Another "sani" is made in the following manner: Three sers of khalli are soaked in water. Four sers of mahua fruit (*Bassia latifolia*) are likewise soaked in another vessel. When soft both are mixed with two sers of cotton seeds and given to eat. These "sanis" are very nourishing and refreshing after a hard day's work. Some cattle receive one chittack of salt in their food daily.

The poorer class of cattle receive two bundles of green grass, two basketsful of wheat husk, and occasionally a ser of gram with which is mixed half a chittack of salt morning and evening.

In the cold months the cattle receive similar diet with the exception of the addition of a hundred pindees of dry ramnah and one bundle of green kurbi. Some people beat a couple of eggs up and give it in the bullock's evening meal.

It is the custom in Saugor occasionally to give two or three bundles of herbs containing medicinal properties with the food. The most common is Teoree (*Ipomoea turpethum*).

In some villages the inferior plough cattle are given in addition to their dry grass a basketful of urad husk (*Phasiolus radiatus.*)

The poorer class cattle are only grazed during the summer months, while the superior animals are fed well all the year round,

In many parts plough cattle, if hard worked during the hot months, are given 12 chittacks of ghee (clarified butter.)

The herds of this district are sent during the slack times to the forests of Aschand, Kusiari, Pipla, Jhirpatek, and Dhamoni.

Jubbulpore District.—During the rains the cattle receive in some parts one basketful of wheat husk in the morning and the same in the evening with the addition of a ser of khalli, In others the animals receive two bundles of green grass in the morning and evening and two sers of gram with one chittack of salt every four days. The animals also graze. During the cold weather they receive six bundles of green grass with either a small bundle of paddy or one of teora *(Lathyrus sativus.)* In addition to this they either get in the evening two sers of gram, or one of linseed cake. In some parts of this district a ser of cotton seeds or one of mahua fruit is given. Straw is always given.

The animals receive similar diet to this in the hot weather with the addition of a "sani" made by soaking two sers of linseed cake in water and mixing it with a basketful of wheat husk. In some parts of the district cotton seeds are substituted for the linseed cake. Occasionally wealthy cattle owners give their favourite animals oil or ghee in their evening meals. The seeds and pods of the Babul tree (*Acacia Arabica)* is frequently given when grass is very scarce. The inferior cattle only receive a portion of the quantities above named and are mostly dependent on grass for nourishment.

The principal grazing grounds are the Kemhori hills, the Jowli hills, the Patkuar jungle and the Muria jungle.

Hoshangabad District.—The cattle of this district are fed in a similar manner to those of Saugor, the inferior animals receiving half, and even less than the quantity given to the superior class.

The Tiura (*Lathyrus sativus*) is largely used for cattle feeding in this portion of the Central Provinces, and the seed often given as a substitute for gram. If used

for human food in large quantities, the seed, under certain circumstances, is said to induce paralysis of the lower limbs, so that care should be used in its administration as food. After a hard day's work the cattle owners of their district give their animals a powah (8 oz.) of linseed oil through a bambu pipe. The cattle are seldom sent away to grazing grounds, but when the fodder becomes very scarce they are driven to the jungles of Handia, Bopalpur, Timlawadi, Samardha and Morghat and to the jungles of the Chhindwara district.

Nimar District.—During the rains a valuable animal receives two measures (basketfuls) of wheat chaff in the morning and one measure mixed with two seers of cotton seeds in the evening, besides the grazing round the village. From two to three sers of oil cake (khalli) is sometimes substituted for the cotton seeds.

During the cold weather a bundle of green grass is given morning and evening. The weight of a bundle of green grass is about 20 lbs. In addition to this animals of a superior breed receive two bundles of karbi (about 6 pounds each). Karbi is the straw of the jowari, (*Sorghum vulgare*).

In the hot weather when at work they receive daily two seers of cotton seeds before starting in the morning. After finishing the day's work in the evening they receive three seers of Tur (*Cajanus Indicus*). Channa (Bengal gram) is sometimes substituted for the above. Two bundles of karbi are also given twice a day.

Most of the cattle of this district graze round the respective villages, some are sent to Dhamangaon. Those from Burhanpur are sent to Sirpur.

Wardha District.—All animals are allowed, during the rains, to graze from 4 to 7 o'clock in the morning, and from 5 until 9 o'clock in the evening. Grass forms their principal diet. At the commencement of the rains the cultivators invariably give their animals a handful of salt for 7 days consecutively. The wealthier ryots give their cattle from 3 to 5 seers of Lakholi (Tiura). Some give linseed cake instead of grain.

The food during the cold months consists of green grass and either cotton seeds, grain or linseed cake. The animals during the hot weather receive either dry rumnah grass or karbi and kutar. The cattle belonging to the poorer classes seldom get any other food than grass, unless they are at hard work, which happens in June and July, and again in October and November.

The herds in Hinganghat and Wardha Tahsils are grazed in the jungles near their villages and are not, as a rule, driven to any distance. In the Arvi Tahsil the cattle are grazed in the neighbourhood of their villages from July until February, after which date they are driven to the Balaghat and Mandla districts, where there is a plentiful supply of pasturage and water. Some cattle are taken to graze on the banks of the Wardha river.

Nagpur District.—Most of the cattle during the rains subsist entirely on green grass, but the higher class animals are given either gram, linseed cake or kutar. During the cold weather only green and dry grass are given, in the hot season, karbi, gram, wheat husk and lakholi.

For a big pair of bullocks 10 to 15 pulas of karbi and eight to ten seers of lakholi is the usual ration, or a hundred pulas of dry grass, four to six sers of khalli or a large basketful of kutar is sometimes given instead. A pula of karbi weighs about five pounds and a pula of dry rumnah grass about half a pound. Karbi is never given with green grass or kutar. Neither are linseed cake and gram given together.

Cattle in the Nagpur, Ramtek and Umrer tahsils are grazed near their villages, but those from Katol are sent away to the same grazing grounds that the Arvi herds are taken too.

Chanda District.—The cattle here mainly subsist in the rains on karbi, (juari straw), rice straw, or green grass. In the cold months they are given grass, and a mixed food of dhal, (*Cajanus Indicus*), mahua and linseed meal; when at work during the hot weather months they receive conjee,

made of either juari or wheat flour. They also get either karbi or rice straw and a mixture of dhal and linseed cake.

As a rule the cattle are grazed in the neighbourhood of their respective villages, but are sometimes driven to grazing grounds.

Bhandara District.—The feeding is somewhat similar to that given in Balaghat. The kutar in this district is composed of lakholi and wheat. Dana signifies a mixture of lakholi, mahua and kodu. The herds are usually driven to grazing grounds from the 15th June until 1st November. The best pastures are at Pepperwan, Chakapatee, Baghada, Badwanee, Landazaree, Langadee, Pattahad and Dongree. From November until June the cattle graze in the vicinity of their own villages.

Balaghat District.– The plough cattle receive during the rains a daily ration of rice straw and green grass, with a kutar of lakholi, linseed and Bengal gram. In the cold weather they receive gram, green grass and rice straw. During the hot months they are given half a big basketful of the kutar, and about 30 pounds of rice straw. In other parts of the district, 5 seers of karbi and 2 pailis of gram, (a paili is about 2½lbs.,) constitute a daily ration. Karbi and rice straw are never given together.

In this district the country is divided into table land (tikara,) and low land (dalka.) The high lands are well watered, and there is consequently an abundance of rich pasturage. The cattle on the low lands are grazed in the vicinity of their villages from June to December, but from the latter month until the monsoon bursts, they are sent to the uplands.

The best pasture grounds in the district are said to be Raigarh, Kinarda, Bharoke, Pola, Bhimlat and Bigargarh. These localities are so noted for their rich pasturage, that the cattle from Katol and Arvi are frequently driven thither.

Raipur District.—During the rains the cattle only subsist by grazing. It is the exception for them to be fed with grain. Occasionally they receive a quarter of a seer of linseed cake, and half a seer of peas, with one chittack of salt. In the cold weather animals are given rice straw or dry grass, half a seer of peas and tiura. Sometimes a basketful of wheat or rice husk is given ; when the grass is scarce during the hot months each bullock receives from one to two seers of peas daily, with about three quarters of a seer of linseed cake; dry grass is also given.

Bilaspur District.—The feeding in this district is similar to that in Raipur. During the rains all the cattle, except the plough bullocks, are sent to the hills and Government forests.

These accounts show that the better classes of cattle are, on the whole, well cared for. The Chhattisgarh cattle must, however, be excepted. They depend on grazing alone during the rains, and till the rice is threshed out, that is to say, till the month of January, long before which time grazing grass has practically been exhausted; and the rice straw which they then receive, is as poor a cattle fodder as can well be given, and contains the very smallest nutriment. Indeed in some parts of India it is considered useless for cattle food. The Raipur and Bilaspur cattle appear to receive, when in work, grain of the vetch pea called "tiura" (*Lathyrus sativus*), which, though undoubtedly unwholesome, contains a large amount of nitrogenous food. But the staple cattle food of the Chhattisgarh districts is rice-straw, and this is not given till the last shreds of grass have been grazed off the village plains. This is of itself sufficient to explain the fact, that Chhattisgarh suffers from cattle disease far more than any other part of the Provinces. It is a tolerably safe generalization to make, that the condition of the cattle of a tract depends on the character of the crops grown in it more largely than the condition of its human inhabitants. The reason lies in the fact that crops of equal importance or profit, as regards their primary products, differ very widely in the value of their secondary products or refuse, and it is this refuse which forms the principal article of cattle food. Cotton cake is a highly nutritious cattle food, and cattle in cotton-producing

districts, are, as a rule, above the average. The same remark applies, though in a less degree, to the cattle of districts growing wheat and juari, the straw of both of which are fairly wholesome food for animals. But rice straw is out of all comparison inferior to wheat or juari straw for purposes of feeding cattle. If in *its grain* it is as a source of human food inferior to wheat or juari, in *its straw*, as an article of cattle food, its inferiority is infinitely greater A diet of rice straw is of itself sufficient to account for the liability to disease of the cattle of Raipur and Bilaspur. The dampness of the country may be also a potent cause of this, but the use of rice straw as cattle food is sufficient without it.

I note that from the reports it seems that salt is occasionally given in some districts. It is difficult to overrate the importance of giving cattle salt with their food. In small continued doses it promotes the appetite and assists the process of digestion and assimilation. It is said, and I think with much truth, that its judicious use tends to ward off an attack of malarious and epidemic disease. Nearly all vegetable substances contain a certain amount of the Chloride of sodium (salt). It has been affirmed that animal life cannot be sustained without it, and it has moreover been stated that its temporary withdrawal has been followed by disease. Here then we have an important agent which is at once a stimulant to digestion and appetite, an alterative and an antidote, if I may so call it, to epidemic diseases. It is also a destroyer of internal parasites and an excellent purgative when given in doses of a quarter to half a pound.

PART II.

Rinderpest.

Vernacular Names.

1 Saugor—Mata.
2 Jubbulpore—Mata, Mahamai Sita, Devi.
3 Hoshangabad—Mata.
4 Nimar—Mata, Rog, Devi Mata, Wara Dasta.
5 Wardha—Mata, Ahyi; Devi.
6 Nagpur—Mata, Devi, Ahyi.
7 Chanda—Devi, Mata, Marrayi, Pochama Jel.
8 Bhandara—Mauli, Mata, Devi.
9 Balaghat—Devi, Mata.
10 Raipur—Mata.
11 Bilaspur—Mata.

This disease is certainly the most formidable of any with which we have to deal, and for this reason it has been thought advisable to describe it first. Throughout the Central Provinces it is recognised by the people as being a disease similar to the small-pox which attacks human beings, hence the common name "Mata" by which it is generally known. The disease is however neither communicable from cattle to the human subject nor from man to animals.

Character and Symptoms.

The disease is of a most highly contagious character, dependent upon specific organisms, which if they once gain admittance into the system of one animal in a herd generally give rise to a great loss of cattle, according to the virulence of the attack. Deer, sheep and pigs are equally liable to become affected, According to the reports placed at my disposal it would seem that this disorder causes the greatest number of deaths among cattle throughout the Provinces.

An attack proves fatal about the seventh day after the manifestation of the first symptoms of the disorder: its period of incubation varies somewhat considerably. In some cases it is supposed to extend from 4 to 7 days or 12 at the outside. Five days however may be taken as a period of incubation. The animal is observed to be listless and dull, and stands apart from the rest of the herd. The temperature of the body is high. This indication of the disease occurs from 24 to 36 hours before any other symptoms are observed. The animal is then seen to refuse its food, it performs the act of rumination irregularly. There is an increased discharge of

saliva from the mouth. The hair of the skin stands straight up, the back becomes arched, and the animal then exhibits evident signs of the affection, viz., extreme dullness, rapid loss of power, irregular feeding and rumination, and if the patient happens to be a cow in milk, there will be a marked diminution in supply; a cough is very often present. The above may be termed the first stage of the disorder and lasts from two to three days. In the second stage the symptoms just enumerated are intensified. The pulsation which previously had been scarcely perceptible now becomes quicker and more easily felt. The cough and breathing is more frequent and the breath quite fœtid. Muscular twitchings commence and continue with more or less violence; these peculiar muscular spasms affect the front part of the chest and neck and sometimes the hind quarters, the ears droop, eyes are dull, the mucus membranes of the eye and mouth (and particularly the vulvœ in females) assumes a blushed and afterwards a dark purple colour. The animal at this stage entirely refuses food. The skin, horns, and ears are hot, and owing to the mucous membranes of the eyes, mouth and nostrils being affected, there is an increased watery discharge from them. The patient experiences an intense thirst, and the dewy appearance of the muzzle gives place to a dry reticulated surface. The urine is hot and of a high colour, the excreta are liquid and mixed with mucous and blood. Ulcerations may be seen on the gums and on the parts usually devoid of hair. During the third stage all the above symptoms are aggravated. Total loss of appetite is invariable. It is about the fourth day that the small elevated tumours appear sometimes in various parts and in many cases over the whole body. To these succeed eruptions of pimples and consequent yellow crusts.* Occasionally these pimples are not observed. It is however in the mucous membranes of the body that the specific changes really

(*). It will be observed that the skin is almost always involved more or less in this disease, The appearances may range from a scurfy condition to an eruptive stage, the matter from which mats the hairs together. Again these pustules may spread and run into one another, as it were, forming often brown patches of very considerable size. The hair in the vicinity of these patches can be removed with the greatest facility, leaving large bare places which give the animal the appearance commonly known by the term "mangy;" sometimes the skin is entirely denuded of its natural covering, leaving the surface sore and irritable.

occur. On the membrane of the mouth which covers the lips, gums, palate, and tongue are to be seen slightly red, tumified lumps, which may occasionally be confounded with the appearances in the mouth in cases of foot and mouth disease; but an ordinary observer on close examination will readily tell the difference between the two diseases.

Roughly speaking, the mucous membrane is composed of a basement membrane on which a vast number of flat particles termed epithelium are laid. The epithelium is placed superficially and is insensible, so that it serves to protect the more sensitive membrane from injury.

The conjestion of the mucous membrane is succeeded by a throwing off of the epithelium from its basement membrane. The elevations or tumours above alluded to are due to the alterations of the membrane and its covering. The yellow masses of thickened and altered epithelia are then but slightly adherent and can easily be removed, leaving highly sensitive vascular patches surrounded by a white membraneous material. These are first noticed on the gums and tongue, and when thrown off pass out of the system with a profuse discharge of saliva. The excoriations extending over the mucous membrane of the mouth, tongue and gullet prevent the animal from partaking of even soft food.

A watery acrid discharge from the eyes trickles down and excoriates the skin. Later on the secretion assumes a gelatinous consistency and accumulates at the inner angle of the eye.

In the last stage the animal evinces acute pain, particularly during the act of defecation, indicating the extremely sensitive condition of the bowels. Excessive diarrhœa sets in. The evacuations are of a thin watery description tinged here and there with mucus and blood and are passed quite involuntarily. The animal winces if pressed over the loins, a recumbent position is persistently maintained: in fact the animal is too exhausted to rise. The feet and extremities now become cold. The undigested food in the first stomach generates gases which produce distension. The poor beast, now thoroughly emaciated and exhausted, dies.

The disease lasts from 4 to 7 days, and if the patient is able to pull through the first 5 days some hope may be entertained.

Recovery takes from three weeks to a month.

The natives say that if the pustules break out freely over an animal there is a great chance of its eventual recovery.

The following is a recapitulation of the symptoms in a concise form.

First stage—

(*a*). Increased dullness.
(*b*). Isolation from its companions.
(*c*). Ears, horns, and skin hot.
(*d*). Arching of the back.
(*e*). Thirst.
(*f*). Loss of appetite.
(*g*). Urine high colored.
(*h*). In cows, diminished secretion of milk.
(*i*). Slight husky cough.

This stage lasts about two days.

2nd or febrile stage—

(*a*). Increased temperature of the horns, ears and skin ; the pulse is more pronounced in tone.
(*b*). Intense thirst.
(*c*). In cows complete cessation of lactation.
(*d*). Increase of pulse and respiration.
(*e*). Muzzle dry.
(*f*). Small red pustules on the pad of the upper jaw. These eventually become ulcerated patches.
(*g*). An acrid watery discharge from the eyes, nostrils and mouth.
(*h*). The tongue becomes swollen.
(*i*). Total loss of appetite.
(*j*). Rumination ceases.
(*k*). Cough continues.
(*l*). The hair on the body stands erect, giving a curiously rough appearance to the coat.
(*m*). The back becomes arched, giving evidence of internal pain.
(*n*). Fœces covered with mucus and tinged with blood.
(*o*). Pain and comparative difficulty in defecation during this stage, which lasts 3 days.

Third stage —

(*a*). Diminution of temperature, particularly at the extremities of the body.

(*b*). Small ulcers form in the mouth, on the pad, on the tongue, and inside the cheeks, which extend to the throat, and mucous membrane of the intestinal canal.

(*c*). Fœtid diarrhœa commences.

(*d*). Eruptions form over the whole body and appear like a yellow crustation : the hair in the vicinity of these eruptions may be readily removed.

(*e*). The evacuations at this stage pass away involuntarily.

(*f*). Gases are generated in the first stomach causing tympanitis.

(*g*). Appearance of the greatest distress and prostration. The animal generally succumbs on the seventh day; if it is of a strong constitution, and has been well cared for, the above symptoms are modified, and it generally recovers. But owing to the extreme prostration, some weeks elapse before an animal is fit to mix with the herd.

Post mortem symptoms.

The appearances observed on opening the body after death are—

1. On opening the rumen or large stomach extensive patches of a dark red color are observed.

2. In the third stomach the ingesta are invariably hard and caked. It has often been noticed that the ridges of this stomach have become ulcerated, probably due to sloughing of the lining membrane, and that they have become perforated in consequence.

3. The fourth and true stomach is invariably congested, especially near the entrance to the smaller intestines, where extensive blood discoloration and sloughing processes are observed.

4. The small intestines are rendered dark in appearance by the altered character of the mucous membrane, which is congested in a streaked and patchy manner. This condition is a distinctive feature of the disease.

5. The rectum is especially involved. Here there are large congested surfaces, extravasations and sloughs.

6. In the mouth, on the tongue, and lips and continuing from the throat and gullet to the first stomach are ulcerations and sloughs.

7. The contents of the intestines are nearly always found to consist of a brownish mucoid mass, much stained by blood. The small glands of the intestines are more often than not diminished in size, and covered with a layer of light colored material.

8. The lining membrane of the gall bladder undergoes the same change as does that of the intestines.

9. The liver is usually congested and friable, and the gall ducts are filled with small masses of yellow material.

10. The spleen is also much congested, and filled with black colored blood.

11. In the lungs no special changes are noticed excepting in some cases where they beoome congested.

12. On opening and exposing the windpipe and bronchial tubes, they are seen to be much discolored, having on their surfaces spots of blood. The gullet is invariably ulcerated, and the air passing over this intensely irritated membrane produces the coughing which is one of the early symptoms of the disorder.

13. The kidneys are usually enlarged, and the mucous lining of the kidneys, the urethra, (which convey the urine from the kidneys to the bladder) and of the bladder undergo similar changes to those observed in the mucous coat of the intestines.

Such are the usual appearances which may be seen by a careful observer on making a *post-mortem* examination on an animal recently died of rinderpest. Of course all these

symptoms may not be exactly the same, but all the important characteristics will be remarked to a great or less degree.

Causes.—The causes of this disease in conjunction with that of the epidemics of other disorders have been dealt with in the earlier part of these papers. There can be little doubt but that the epidemics are due to the entrance into the system of a specific organism which has, up to the present date, eluded the earnest and laborious researches of the most able Pathologists. That spores of disease called micrococci have been found in the capillaries of blood vessels is well known, but the characteristic germ is still undiscovered.

Treatment recommended.

1. Having noticed that the anival is not in health, the first step to be taken is segregation. A small space of ground should be penned off towards the leeward side of the village, where there may be a waste piece of land. *I lay particular stress upon this first act.* Now that the animal has been separated from the herd, thus minimising the chances of spreading the contagion, administer the following in a draught :—

Linseed oil	...	½ seer.
Country spirit	...	2 chittacks.
Water	...	1 chittack.

Water should be placed in the enclosure, so that the patient may have easy access to it. In this water should be placed a small handful of Nitrate of Potash (Shora). The Nitrate of Potash may be given in this manner daily throughout the duration of the disease : on the third day an aperient draught of Linseed oil may be given with benefit. The use of Epsom salt is much to be deprecated in this disease as it tends to irritate the mucous lining of the intestinal tract. Linseed oil, on the other hand, is an effective purgative and contains much nutritive material. It likewise allays irritation of the mucous lining. If carbolic acid can be obtained the second draught might consist of the following with advantage :—

(*a*) Linseed oil	...	½ seer.
Country spirit	...	1 chittack.
Carbolic acid	...	¼ chittack.

During the second stage vegetable tonics ought to be given, as in this prostrating disease it becomes imperative that the animal's strength be preserved as much as possible. The following prescriptions can be readily made up in most of the bazaars :—

(*b*) Gul oil	...	2	chittacks.
Chiretta	...	2	do.
Country spirit	...	1	do.

Gul oil and chiretta must be well pounded and boiled in a seer of water ; when cold the spirit is to be added, and the whole given in a draught. This might be administered with benefit three times a day,

(*c*) Chillies, red	...	1	chittack.
Ginger	...	1	do.
Cloves	...	1	do.
Cardamom	...	1	do.
Country spirit	...	1	do.
Camphor	...	1	do.

Thoroughly boil the ginger, cloves, and cardamoms together and 1 seer of water, and set to cool. Then dissolve the camphor in the spirit. Give half in the morning, and half in the evening. At this stage good nursing will go far to help a patient to pull through. Every two or three hours rice or any other congee may be given freely by draught. I prefer linseed congee to almost any other, on account of its nutritive and soothing properties. Any food that the animal seems inclined to eat must not be refused. At this period febrile symptoms set in, and the following remedies are indicated :—

(*d*). Wet pieces of cloth thrown over the head and body of the patient, and kept constantly moist. This combats the local symptoms.

(*e*). Boil ½ seer of the inner bark of the Nim tree in 6 seers of water : strain while hot. When cold give one seer of this decoction every two hours. Black salt, 1 chittack in a seer of congee, should be given every alternate hour with the Nim bark decoction.

This Nim decoction is an astringent tonic and is of great service as a febrifuge. It will be remembered that at the febrile stage pustules form, and diarrhæic sypmtoms set in: thus we have in this decoction a simple and very easily obtained remedy. The diarrhæa and dysentery are best combated by a decoction of Bel fruit. It is made in the following manner:—

(*f*). Take 4 seers of Bel fruit, break them up and boil in 12 seers of water; while hot strain through a coarse piece of cloth, and place the fluid in a shady place to cool. Give 1 seer of this fluid every 3 hours, so long as the diarrhæa and dysentery last.

(*g*). If the diarrhœa is very persistent,

Carbolic acid	...	½ chittack,
Linseed oil	...	4 chittacks,

may be given in a draught with advantage.

When the animal becomes convalescent, the most nourishing and appetising food ought to be placed before it, in order to encourage it to feed. At the same time the following excellent tonic must be administered in a seer of good rice or linseed congee:—

Sulphate of iron (Hira-kasis) 1 tola powdered and given in congee; or,

Chiretta ...	...	1 chittack.
Sulphate of iron	...	1 tola.
Country spirit	...	1 chittack.

The chiretta and sulphate of iron to be boiled in water and when cool the spirit is to be added and the whole to be given as a draught, and repeated twice a day.

After the fourth day the Sulphate of iron must be discontinued, as obstinate constipation often results from its too frequent use.

Camphorated oil, made by dissolving ½ a chittack of camphor (kapur) in three chittacks of cocoanut or other bland oil, applied to the eruptions and excoriations will very much facilitate the healing process and prevent flies from depositing

their eggs on these parts. Great trouble will certainly be experienced if these symptoms are not attended to, particularly if maggots become lodged in these sores. When tympanitic symptoms are observed the following will often relieve the patient :—

Assafœtida (Hing) 2 tolas.

It is best given in the form of a draught and must be prepared by rubbing down on a rough stone 6 tolas of the assafœtida, and then boiling in a seer of water ; one third may be given every hour. If the tympanitic condition has not been reduced then give the following :—

Lime	...	... 2 tolas.
Water	...	... ½ seer.

Native remedies.

Cattle owners very rarely treat this disease, but rely principally on religious observances and charms. The following are a few of their prescriptions :—

1. Plantain leaf and burnt almond shells mixed together in water and given to drink.
2. Shora (salt-petre) and the sap of the plantain tree given in water.
3. Petondi leaves, Bukkun leaves and Talkhunbha made into an infusion.
4. One tola each of the following :

   Pepper,
   Padola,
   Tira,
   Gokru,
   Wackchandnee,
   Makayi,
   Manaru,
   Bhuckola,
   Chillies,
   Bumarakas,

   to be given in ½ seer of toddy 3 times a day.
5. Bark of Mahanib and butter mixed together and applied to the mouth.
6. Onion and turmeric mixed with butter-milk.
7. The sap of the Semal tree (Silk cotton) mixed with congee and given to drink.

Anthrax.

Vernacular Names.

(1) Saugor.—Bhaora, Ghat sarap, Ghadkania, Manmudi.
(2) Jubbulpore.—Palkan, Bhaora, Tilvan, Chhai.
(3) Hoshangabad.—Manmudi, Chhai.
(4) Nimar.—Phasi, Tiruk, Burri, Guni, Mani, Goli, Choti, Ghadkania, Ghat sarap, * Manmudi.
(5) Wardha.—Sar, Ghusghuria Rog, Phasi, Sherra, Ghat sarap, Kudia, Tadak Phasi.
(6) Nagpur.—Sad or Sar, Sherra, Ghat sarap, Phasi Ghurghuri.
(7) Chanda.—Sada, Sar, Mendakya darad, Boradya darad, Ghat sarap, Tadak Phasi.
(8) Bhandara.—Sar, Ghurghuria rog, Ghat sarap, Dokria rog, Phasi.
(9) Balaghat.—Mandki darad, Sar, Waradia darad.
(10) Raipur.—† Sonai chai, Chitbojh.
(11) Bilaspur.—Chhai, Lohra, Chai rog, Sonai.

I think it will simplify matters if Anthrax be treated of under four heads, *viz.*—

(*a*). Congestive or Splenic Fever, (Vernacular names—Taduk Phasi, Mendakya darad, Waradia darad, Manmudia, Bhaora, and Sar.)
(*b*). Swollen throat, (Vernacular—Ghat sarap, Ghurghuri, Dokria rog, Goli.)
(*c*). Gloss anthrax—when the blood vessels of the tongue become much congested (Vernacular—Chhai or Tilwan, Sar, Sad, and Phasi.)
(*d*) Black Quarter: when one of the quarters are affected (Vernacular—Kudia Phasi.)

All the above may be associated under the one heading Anthrax. In this country every symptom seems to be considered a distinct disease and is given a name: this will probably account for the large number. The disease in all its forms is highly contagious and very fatal. The researches of Pasteur and Toussaint and many other observers have thrown great light on the nature, causes and prevention of this disease, so

*These seem to be the names of seven varieties or stages of the disease.
† Poolichai (when tympanitic,) Parlichai (when not tympanitic.)

that we are now in a position to considerably reduce the annual loss of cattle by anthrax, if only their suggestions and recommendations are carried out by cattle owners.

The French name "charbon" is, I think, a more appropriate designation than anthrax, which literally means a boil, and is so derived from the manifestation of this disorder in the human subject as malignant carbuncle. The term charbon signifies the black condition of the blood.

The true cause of these disorders is a very minute vegetable organism or germ which gains admittance into the blood, possibly through the air passages to the lungs but more probably through the digestive system. The name *Bacillus anthracis* is given to this germ. In the blood it rapidly reproduces itself until, in a very short time, the minute blood vessels (capillaries) are simply blocked. This condition causes disease of the structures involved.

When the bacilli are few, no outward symptoms of the disorder are, in many cases, to be observed; in others however a slight rise of internal temperature may be noted. If the animal's system is in such a state as to be favorable to the development of the disease the germs then rapidly multiply and produce a highly disordered condition; but if on the contrary the animal is healthy the patient will show slight febrile symptoms and rapidly recover. In the earlier part of this report I have given a few useful hints on keeping animals in health, and it is unnecessary to recapitulate them here.

The disease in its more virulent form runs a very short course; in some cases only an hour, other cases may last fully seven days. In the worst form of anthrax no warning is given: the animal simply turns giddy, falls down and dies shortly afterwards.

It has been proved that these Bacilli are the producers of Anthrax. Toussaint's exhaustive experiments seem to prove that they accumulate in enormous numbers in the small vessels of the lungs and brain, and by "blocking up" these passages produce what may be termed mechanical asphyxia. Some authorities still deny that these germs are the sole cause

of anthracoid diseases, and they consider—

(*a.*) That the disorder may originate spontaneously.

(*b.*) That these organisms are only accidentally present in the blood.

(*c.*) That the germ known as Bacillus anthracis may be present in an animal's system without producing the disease.

But the following well known facts ought to dispel any such theories as those just mentioned, *viz* :—

(*a.*) That these bacilli are *invariably* present in the system in case of anthrax.

(*b.*) That an inoculation from a case of anthrax in which these germs are known to exist will invariably produce anthrax.

(*c.*) That these bacilli in the condition of spores have a remarkable vitality and can bear any extremes of temperature and dryness to which they may be subjected to in nature.

(*d.*) That all animals are liable to become affected with this disease,—wild animals, carnivorous birds and even flies may be vehicles of the contagium.

(*e*). An animal which has died of anthrax and remains exposed to be devoured by dogs, &c. becomes at once a centre of contagion.

(*f*). The fungi that are capable of producing the disease have been found on the grass, and in the ground where animals that have fallen victims to anthrax have been burned.

(*g*). These specific germs in the spore condition may exist for a long time dormant and can subsequently enter into the animal system and generate anthrax.

(*h*). Anthrax is most frequently observed near marshy places or where water becomes stagnant during the hot months.

(*i*). When the disease assumes an epidemic form it has been noticed that the climatic conditions are more than ordinarily favourable to the development of other fungi.

(*j*). Heat and moisture are necessary to the growth of bacilli.

(*k*). The severity of the symptoms is in proportion to the ratio of the number of organisms present to the strength of the animal.

The foregoing conclusions have been the result of long and studious researches of many of the most advanced Pathologists of our time: they therefore may be accepted with confidence. My own experiences amply corroborate these deductions.

The native cattle owners in speaking of this disease, state that it is a kind of contagious disease: for if the saliva of a diseased animal is touched by others they also become affected. Again, if animals lie on ground which had recently been occupied by diseased cattle they become infected.

Symptoms.

The form of anthrax known as congestive fever is probably the most obscure of all the phases of the disease. During the early part of the attack, more often than not, there are no external symptoms to guide the herdsman by, saving that the patient stands isolated from the others. On closer examination, however, the coat will be found harsh and staring, and the horns and body very hot. These may be termed the general symptoms. It now depends upon the obstruction caused by the germs to indicate the locality of the disease. For instance if the lungs (which is very frequently the case) become the seat of the obstruction, all the symptoms of congestion of the lungs will be observed, such as difficult breathing and eventual suffocation.

If the vessels of the brain are "plugged" the symptoms presented are those of giddiness or the more violent forms of apoplexy. Then again the blood vessels of the intestines very frequently are implicated when we have all the indications of inflammation of the bowels, such as intense pain, haggard expression of face, constipation and constant moaning and bellowing. Thirst is always excessive.

In cases where the brain is affected the animal usually succumbs without any warning.

Swollen Throat.—This is the most easily recognised of all the forms of anthrax. The disease is not so rapid nor so severe as in the other instances. A soft gelatinous swelling gradually appears under the throat, which often increases to such an extent that the head is also implicated.

The pressure on the windpipe caused by this swelling greatly affects the breathing and indeed frequently stops the process of respiration altogether. In all cases of anthrax the temperature of the body is very high. A coffee coloured fluid is discharged from the nostrils, and the eyelids are much swollen. Constipation is almost invariably an attendant symptom of this disease. Gloss anthrax differs from the preceding form in that the tongue and interior of the mouth and throat are the seats of disease. The tongue becomes much swollen, especially at the base, and is of a dark purple colour, due to the veins being much distended with black blood. The mucous membrane covering it and the inside of the lips is sometimes raised in the form of blebs. From the mouth a dark red fœtid fluid flows. Large sloughing ulcerations remain and the surrounding parts are congested and swollen by extension of the inflammation. The animal entirely refuses food, rumination ceases, it looks dull, its eyes are heavy, mouth hot and parched and coat staring and rough. The black colour of the tongue extends far back to the throat. At a later stage the respiration becomes very difficult and the patient pokes out its nose for relief. The breath is very offensive. The tongue protrudes from the mouth and the disagreeable discharges continue. These symptoms increase in severity until, at last, the beast dies from suffocation. Should recovery take place, which is very seldom, there will almost invariably be a considerable sloughing of the membrane of the tongue. Convalescence is long and protracted and the patient must be nursed with the greatest care.

Black Quarter.—This form is seldom seen in these Provinces. The term is derived from the black appearance of a limb when a section is made after death. The colour is due to the staining of the tissues by the decomposed blood. An animal in apparently rude health is, in the space of a few

hours, seen to be dull and stiff, moving with difficulty. The part affected soon swells, and emits a crackling sound on pressure with the fingers somewhat like dry parchment. This peculiar sound is due to the gases generated from the decomposing blood which has escaped into the connective tissue situated immediately under the skin. The limb becomes tumified and very painful and is with difficulty dragged along by the animal.

The disorder principally affects the shoulder and hind quarter of an animal. It is considered not to be anthrax, but of an anthracoid nature, but in a post mortem examination the same general lesions are to be observed.

Post mortem appearances.

On opening the abdomen a quantity of fluid will be found. If the intestines have been the seat of the disease many portions of the bowels will be black and mortified. The lymphatic glands are much enlarged and congested with black blood and imbedded in a yellow gelatinous mass. The spleen is invariably much enlarged and engorged with black blood.

The swelling around the throat when cut into shows simply a huge mass of the peculiar yellow gelatinous material. This substance is simply the serum of the blood which has been forced through the coats of the blood vessels into the surrounding tissue. I have come to this conclusion by examination of the fluid from this mass and from the contents of the adjoining blood vessels under the microscope. I have found only a very few germs in the exuded serum, while the blood has been crowded with them. I think that the bacilli join with the minute bodies termed blood corpuscles and actually force the fluid (serum) out of the vessels by mechanical pressure.

On different parts of the membrane which lines the walls of the abdomen and internal organs are usually seen dark patches. These are due to the rupture of the vessels through supercongestion and the staining of the surrounding tissues by the colouring matter of the blood contained in the blood corpuscles. The blood if examined under the microscope with a high power will always be found to contain Bacilli anthracis.

Native treatment.

Cattle owners have an enormous number of receipts for this disease, which are, however, of little use. The practice of applying a red hot iron over the swellings on the body and throat has been found to be serviceable in a few instances. In cases when the tongue has become the seat of the disease, the common mode of treatment is to cut off the ears of the suffering animal and beat it about the head with bamboos. The idea is to make the blood flow freely from the cut surfaces. This mode of treatment is, I think, sound in principle —relieving the congested vessels—but the operators might be more tender in their method.

The following are the Native remedies used for anthrax:—

Saugor.—

(1). Spirits, 1 chittack, given three times a day

(2). Kernel of Dhai, 2 pice weight.
Moha ajwan, 1 pice.
Gogal (Bdellium), 1 tola pounded and given with two chittacks of ghee.

Jubbulpore.—

(1). A line is drawn round the body with a hot iron, and vinegar is given daily.

(2). Surwan bulb is boiled and given to eat.

Hoshangabad.—

Tobacco,	1 tola.
Tikladi,	1 tola.
Kusam,	1 tola.
Turmeric,	1 tola.
Toddy,	1 seer.

A quarter of the above is given every fourth hour.

Nimar.—

Ghee and toddy are mixed with conjee and given three times a day.

Wardha.—

(1). Pepul bark.
Ginger.
Pepper.

(2). Root of Terwan.
,, Ekdodee.
Charcoal of Teakwood
Given in spirits (toddy or mahua spirit.)

(3).—Roots of Dhat.
,, Dhawoda.
,, Kakayee.
,, Bharotee
Decoction of the above given three times a day.

(4). Sawa Grass.
Decoction of Pand root.
Powdered Tikhadi root.
Powdered Katiayan.
Root of Dhurpulas.
One tola in 10 ounces of spirits daily.

(5). Root of Mohali.
,, Huldi Kolam.
,, Talu.
,, Amratayawan.
Given three times a day.

(6). Root of Wakchandni.
,, Terwan.
,, Soon podla.
Bark of Maharook.
Soaked in human urine and given three times a day.

Nagpur.—

(1.) Root of Terwan,
Bark of mango tree,
Tobacco leaf,
Pounded together and mixed in human urine, given three times a day.

(2.) Tobacco.
Jaggery.
Old tamarind given in toddy.

(3.) Gokra.
Black pepper.
Ghee—mixed in equal parts, and given three times a day.

(4.) Ghee, 1 chittack.
Salt, 2 tolas.
Chillies, 2 tolas.
Bohyi kokola, 2 tolas mixed and given in milk.

Chanda.—

(1.) Chillies,
Garlic,
Mustard,
and ordinary soot. Equal parts in water three times a day.
The nose is well oiled.
Pig's fat ½ seer is given as a preventive.

Bhandara.—

(1.) Madar, 1 tola.
Keri, 1 tola.
Akol, ½ tola.
Passi, ½ tola.
Pounded together and given to drink.

(2.) Bamboo root pounded and given in water three times daily.

(3.) Shora (Nitrate of potash), 2 tolas.
Petondee leaves, 4 tolas.
Buccan leaves 4 tolas, given in a seer of butter milk.

Balaghat.—

(1.) Mango bark, 4 tolas.
Moongna bark, 4 tolas.
Lime, 2 tolas.
Turmeric, 2 tolas.
Dhowra bark, 4 tolas.
Rice conjee, 1 seer.

(2.) Tamarind, 1 tola.
Salt, 1 tola.
Lime, 1 tola.
Chillies, 1 tola.
Water, 1 seer.

(3.) Castor oil, 2 chittacks.
Pepper, 2 tolas.
Lime, 1 tola.

(4.) Alum, 4 tolas.
Ghunphod, 2 tolas.
Mahua spirits, 4 chittacks.

(5.) Make a decoction of coriander seeds and take 10 ounces, and mix with the following :—

Mahua spirits, 10 ounces.
Ashes of mahua leaves, 4 tolas.
Powdered teakwood charcoal, 4 tolas.
Salt, 2 tolas.

This dose is given three times a day.

Raipur.—

Human urine is first given. After which
Linseed oil 4 chittacks,
Red pepper 1 tola,
Leaves of Mahanib 4 tolas,
Cocoanut 4 tolas,
Kowan 4 tolas,
Tobacco 2 tolas,
and castor seed 4 tolas,
are pounded into a cake and given to eat.

No food is given until the animal recommences to ruminate.

In the Simga tahsil the people apply mud plasters over the head and neck as a remedy for this disease.

Bilaspur.—

(1). Turmeric and linseed oil.
(2). Babul leaves and buttermilk.
(3). Plasters of red ochre and castor oil, also earth saturated with urine applied to the sides.
(4). The horns are burnt by torches, the ears are tied together and the animal is exorcised.

Treatment recommended.

The first care must be to reduce the temperature of the body. This is best done by placing a wet sheet over it and giving 2 tolas of saltpetre in conjee morning and evening. As constipation is almost an invariable accompaniment, linseed or castor oil, 2 chittacks, ought to be given until the bowels are freely moved. Lime juice is an excellent febrifuge. Of course the most important thing now is to remove the exciting cause. This is to be only done by such remedies as are destroyers of fungi. Carbolic acid 1 tola in a pint of Linseed oil should be given three times a day. If this drug is not procurable powdered charcoal affords an excellent remedy.

Fumigation would in this disease be attended with the best results if carried out with care.

As an appendix Pasteur's plan of inoculation has been given. Good nursing is most essential in cases of anthrax.

Foot and Mouth disease.

(Eczema, Epizootic Aptha, Murrain.)

Vernacular Names.

(1) Saugor—Ral, Khuri, Baraiya, Baida, Bekra.

(2) Jubbulpore—Vayda, Baida, Bekra, Gorhahokta, Gorha.

(3) Hoshangabad—Gorha, Godah, Godha hadha, Khusita, Rokti, Khaga, Bega.

Mukheri (foot and mouth affected.)
Khureri (feet only.)

(4) Nimar—Lan, Khari, Ral.
Munh Khuri when the mouth only is affected.
Paon khuri when the feet are affected.
Ral when the hoof sloughs.

(5) Wardha—Tondee khuri, Pair khuri.

(6 Nagpur— Tondee and Pair khuri.

(7) Chanda—Pair khuri, Tondee khuri, Chau khuri, Dakagalee, Nornachundee.

(8) Bhandara—Tondee and Pai Khuri, Nuklee.

(9) Balaghat—Chipka and Khuri.

(10) Raipur—Chipka and Khuri.

(11) Bilaspur—Chipka and Khuri.

Localities.—There seems to be no one special district in which cattle become affected more than another with this troublesome though not dangerous disease. It has spread over the whole of the Central Provinces, and continues annually to attack indiscriminately bullocks, cows, buffaloes, sheep, and goats in every Tahsil. In many instances this disease has been known to affect a herd a second time in the same year, thus proving that inoculation or vaccination would be of no use for its prevention.

Nature of the disease.—It is a contagious fever of a specific and eruptive order, and as above stated is to be met with all over the Provinces. Its special lesions consist in small vesicles, which may occur in the mouth, feet, or on the udder. It sometimes affects the mouth first, and sometimes the feet, but more often than not the mouth, feet and udder are all three simultaneously affected. It is communicable to man, dogs, pigs, and fowl. Esser records a case of three young cats being affected in consequence of drinking milk from cows suffering from foot and mouth disease. Similar cases have been recorded of men. Schrule reports a case in which the disease was transmitted from human being to human being. Lukas found that a dog fed for six days with milk from an affected cow suffered severely from this disease and an accompanying diarrhœa. Dr. Robinson of Dover traced a recent outbreak of Aphthous sorethroat to the milk of affected cows.

The symptoms which he noted in his patients were shivering, followed by headache and fever, pains in the limbs, parched lips, and a vesicular eruption of the throat (Quarterly Journal of Veterinary Science in India). I have quoted the above with a view of showing the possible danger to mankind. That the disorder is contagious is well known to all cattle owners in the Provinces. The period of incubation lasts from one to four days.

Symptoms.

At first the animal is attacked with a shivering fit; the back is arched, and the hair stands erect, giving the appearance of a rough coat; it constantly lifts and shakes its feet as if some foreign substance had lodged between the toes and frequently smacks its lips. On closer examination the horns, mouth, extremities and skin will be found hot, indicating fever, eruptions will be seen in the mouth on the dental pad, the gums, the tongue, and roof of the mouth. As the disease advances the symptoms become more marked. From the mouth the saliva hangs in shreds, the animal grinds its teeth, the bowels are constipated, and the breath offensive. The sores in their primary stage are about the size of a four anna piece, and perhaps a little larger. They are of whitish appearance. In the more advanced stage they assume a reddish colour and are excessively sensative. During this stage the patient is unable to masticate hard or harsh food owing to the mechanical irritation, and ought only to be fed upon soft food. The discharge of saliva is now profuse and hangs about the mouth like foam. In trying to get rid of this foam the animal makes the peculiar smacking sound already mentioned. The ulcers are occasionally seen on the membrane of the nose and muzzle. These vesicles burst in about 20 or 24 hours and leave small red spots. In cows these vesicles frequently appear on the udder and cause occasionally severe complications, such as inflammation of the glands, &c. When these small pimples are ruptured by the calf in sucking, a confluence of them takes place, leaving a large ulceration which produces intense pain, and the animal is usually incapacitated for breeding purposes, in consequence of the mammary glands being unable to perform their proper functions. The lesions of the feet are manifested by pain, restlessness, and, as previously mentioned, a frequent raising and shaking of the legs. This is followed by a swelling round the coronet of the foot, and by a subsequent development of vesicles round

the coronet, but more often in the cleft of the foot. The animal at this stage is very lame, and lies down persistently to save itself the pain which the weight of the body on the feet would otherwise cause. The vesicles in course of time rupture as in the mouth. The watery discharge when exposed to the air soon dries up, and the yellow colored scabs fall away. Occasionally the disease assumes a more virulent form; but this I think is greatly due to the neglect of the most elementary sanitary precautions. Maggots are frequently found in the feet when the patient has received no attention. No animals ought to be kept at work if affected with this disorder, for by so doing the symptoms become more severe, the legs swell, ulcerations are produced, and often the hoofs slough off, leaving nothing but the sensative structure in contact with the ground. Thus intense and unnecessary pain is often brought about entirely through neglect. But I note that almost throughout the Provinces the remedies used for this disease are effective, and that owners as a rule understand the disease, and do all in their power to prevent undue pain. In sheep the symptoms are somewhat similar to those just described, but with this exception, that the feet are more often the first and occasionally the only seat of disease. The disease, as usually seen in the Central Provinces, is of a mild type, and few, if any, deaths occur from the disorder itself. With ordinary care and nursing the graver complications may be avoided. Many deaths from foot and mouth disease have been reported in Jubbulpore, Raipur, and Bilaspur; but I am of opinion that the cases of rinderpest must have been called foot and mouth disease by mistake. It is quite possible to mistake rinderpest for foot and mouth disease in consequence of the ulcerations in the mouth But these two diseases ought never to be confused, for they have characteristic and distinct symptoms. In foot and mouth disease there is generally the peculiar lameness and constipation, whereas in rinderpest we have an exhausting diarrhœa and dysentery and no lameness.

All animals are liable to become affected by contagion, and there can be little doubt that the disease is spread by the spores which are cast off from the feet on the grass. The true character of these fungi have not yet been recognised, but from the fact that some animals are affected frequently, inoculation with cultivated germs will probably be of little benefit as a preventive measure. When ordinary care is

observed and proper remedies applied the disease is not dangerous to life.

Native treatment.

As before stated the remedies used by cattle owners as a general rule are efficacious in the treatment of this disorder.

The following are the most common prescriptions:—

Saugor.—

1. A draught of oil is given internally. Ash is spread on the floor.
2. Kaith leaves (wood apple) crushed and applied to the cleft of the foot.

Jubbulpore.—

1. Tobacco leaves, lime, and wood apple leaves are applied to the feet.
2. Pigs lard 2 chittacks is given to animals as a preventive.

Hoshangabad.—

1. Butter rubbed on the horns, tooth powder and plantain rubbed in the mouth.
2. Dikamali oil applied to the feet; the animals are made to walk in hot sand, and stand in mud to prevent maggots getting into the wounds.
3. Common oil 3 chittacks, kattha (catechu) 1 tola to drink.

Nimar.—

1. Internally 4 chittacks of Til oil (Sesamum Indicum) are given 3 times a day.
2. Butter is applied to the mouth.
3. Camphor, sugar, and tobacco in equal parts made into a paste is applied to the feet, after which mud plaster is applied over it and the whole is bandaged.
4. One pice weight of vitrol is mixed with half a chittack of lime and applied to the feet.
5. Til oil and lime equal parts.
6. Salt and black mud.
7. Til oil rubbed on the horns, and the animal made to stand in dust.

8. If the hoof sloughs off lime is applied to the sensitive structure.
9. Bhilawa (Semecarpus anacardium) and teak oil to the feet.
10. Lime and catechu to the feet.
11. Dikamali oil (Gardenia lucida) to mouth and feet.
12. Lamp oil, dammar, and camphor applied to ulcerations.
13. Tooth powder* scattered on a plantain and exposed to the night dew is in the morning thrust into the animal's mouth.

Wardha.—

1. Black earth mixed with babul leaves is plastered on the back.

Nagpur.—

1. Butter is applied to the mouth and Bawanch oil (Psoralia corylifolia) to the feet.

Raipur.—

1. Mouth sprinkled with butter-milk, Sitaphal leaves (Anona squamosa) Dikamali oil, camphor, assafœtida and alum applied to the feet.

Bilaspur.—

1. Turmeric and butter-milk to the mouth, Castor, Bawachi and Dikamali oils, to the feet
2. Bel, Kerosine oil and Bach powder (Acorus calamus) to the feet.
3. Madar leaves (Calotropis gigantea) boiled in urine and sprinkled on the sores

Treatment recommended.

The affected animals should be housed if possible, or at least isolated from the unaffected ones. The flooring of the cattle shed should be kept scrupulously clean, and every care taken to ensure proper sanitation.

The remedies indicated are firstly general, and secondly local.

To allay the febrile symptoms which usher in the disease dissolve salt-petre 2 tolas in the animal's drinking water morning and evening. If the bodily temperature is much

* Tooth powder is composed of burnt almond shells reduced to a fine powder and mixed with salt.

elevated a wet cloth or sheet saturated with water and spread over the animal will reduce the heat of the body appreciably.

At this stage linseed oil 2 chittacks or castor oil 2 chittacks may be given with much advantage, as constipation is a frequent accompaniment of this disease.

The mouth, when the excoriations are observed, must be washed with tepid water before applying the following :—

1. Alum (Phitkari), 1 chittack.
   Jaggery, 6 chittacks.

The alum and jaggery to be well mixed with a little water and to make it of a treacley consistency, a small portion, about 4 tolas, to be smeared in the mouth morning and evening. The jaggery is simply a vehicle for the alum

2. Salt-petre 2 tolas.
   Jaggery 2 tolas.
3. Catechu (Kath or Katha) 1 tola.
   Jaggery, 2 tolas

For the feet many applications may be used, and none can be more efficacious, more easily obtained, nor less expensive than—

4. Ordinary charcoal well powdered, 1 seer,
   Nim leaves, 1 seer,

made into a paste and a sufficiency used as required ; they may be used alone or combined.

5. Powdered Dikamali resin, 2 tolas.
   Oil, 1 chittack.
   Boil until dissolved.

6. If the ulcerations in the foot are troublesome use
   Lime, 1 seer,
   Nim leaves, 1 seer,

make into a paste a sufficiency to be used as required.

In all these applications to the feet it is imperative that the

remedies should be secured to the affected parts by bandages or pieces of cloth.

7. Tobacco and nim leaves.

8. Sulphate of copper (Tutia) may be lightly applied to the excoriations in the mouth and feet, particularly when proud flesh appears.

9. If the disease has affected the foot to such an extent that there is a probability of its sloughing off, toddy poultice may often be used with much benefit. It is prepared by adding freshly drawn toddy to rice flour till it has the consistency of a poultice, and heating it over a gentle fire, stirring gently, till fermentation commences. It hastens the separation of the slough, and establishes subsequent healthy action.

10. Camphorated oil prepared by dissolving a piece of camphor in a little oil is recommended strongly in the treatment of the feet, especially when maggots are present in the wounds.

11. Resin of Gardenia lucida (Dikamali) 5 tolas.
Bees wax, 5 tolas.
Til oil, 8 tolas.
Powdered gall nuts (Mai phala) 3 tolas.

Boil the powdered gall nut in the oil, then add the Dikamali, and when it is melted strain through a cloth; lastly, add the wax and stir until cold.

With care, cleanliness, proper attention, and use of any of the above prescriptions, the animals will rapidly recover, and probably be fit for work in the course of 15 or 20 days, but if due attenion is not paid the disease may become protracted.

The same remedies may be applied to the affected parts, in cases where pustules are observed on the udder, teats, and other parts of the body.

Particular attention should be paid to the diet of animals affected with this disorder. It must always be of a mucilaginous nature, Hard harsh roots and stalks are

to be avoided, as this kind of food only tends to irritate the ulcerations. Linseed cake and congees constitute the very best diet in foot and mouth disease. The modes of treatment practised by native herdsmen, such as making the animals stand in mud or sand, while it prevents the breeding of maggots, very often delays recovery. This is due to dirt and foreign irritating matter gaining admission into the sores and cleft of the foot. Many cases of sloughing of the hoof have been reported in consequence.

The disease is generally recognized throughout the Provinces as contagious, and the preventive measures advocated in the earlier part of this report may be carried out with advantage.

Pleuropneumonia.

Vernacular Names.

(1) Saugor	...	Phepharia or Phappra, Hipobilai.
(2) Jubbulpore	...	Phopsa or Sohagpuri disease.
(3) Hoshangabad	...	Phopsia, Thathania, Dhadharia.
(4) Nimar	...	Phaphsia or Phepharia, Dhadharia Fikia.
(5) Wardha	...	Phapsia, kudia.
(6) Nagpur	...	Phapsia or Kudia, Phapsia darad,
(7) Chanda	...	Phapsia.
(8) Bhandara	...	Phapsia.
(9) Balaghat	...	Not observed.
(10) Raipur	...	
(11) Bilaspur	...	

Nature of the disease.—It is a contagious disease which locally affects the lungs and pleura, or lining membrane of the cavity of the chest, and, as Mr. Hallen says in his excellent little Manual on Cattle disease in India: "it is peculiar to cattle, affects all breeds, at all ages, on all soils, and in all climates. It often assumes an epizootic character; it is most insidious in its attacks, being sometimes rapid, and sometimes protracted in its course, varying from one to four months, or even a longer period. It does not as a rule attack every head in a herd, indeed it is capricious in the way it spreads." The disease is a tedious one and the period of incubation may be roughly stated as extending from ten days

to two months. While it lasts a constant change is going on in the lungs from a healthy to a diseased state, and it has been definitely ascertained that the disease is comm unicable from one animal to another, particularly towards the latter period of incubation.

Cause.—It is supposed that the specific spores of contagion are carried about through the medium of the air, and that they are received into the system through the lungs; the blood however does not seem to be seriously contaminated. This has been proved by the experiment of infusion. The blood from a diseased animal was injected into that of a healthy one, without any ill results.

Symptoms.

The animal is observed to be dull with a disinclination to join or mix with the herd. The coat stands and a cough will be noticed in the morning and evening, and if the ribs are also pressed this cough is of a peculiar husky and suppressed kind. It sometimes happens that the beast appears to have improved in condition, but this is delusion, The muzzle becomes dry and fever sets in, which lasts for only a few days. The cough now becomes more painful, the breathing difficult, and the nose is protruded to render respiration as easy as possible. At this period will be heard the grunt peculiar to lung disease at every expiration. As the fever subsides the extremities and skin become cold and the breath offensive; a thick mattery discharge of an unpleasant character exudes from the eyes and nose. The skin is harsh and tight to the body, the back is arched, and if the sides of the chest are tapped with the knuckles pain is evidently experienced, for the animal immediately moans. In cows giving milk lactation is invariably suppressed. The bowels continue constipated until the mouth becomes clammy and signs of debility, such as dropsical swellings, diarrhœa, and gaseous distension of the large stomach, usher in death. In many cases the appetite is little impaired. In favourable cases a portion of one lung only is affected, but generally the disease extends to the whole organ, which soon becomes so involved that the animal dies from suffocation. Post mortem examination will show that only the contents of the chest are involved in this disease. On first opening this cavity, instead of the natural moist vapour a large quantity of yellowish

colored fluid, in which a number of clots of yellow fibrinous material will be seen floating about. The lining membrane of the lungs will be found to be adhering to that of the sides of the chest. Pus is mentioned as having been found in the chest, but this I have never seen. The pericardium, or membrane covering the heart, is very frequently involved. The lungs however are the main seat of the disease. A distinctive peculiarity is its circumscribed character, whereby a diseased portion may be situated against a piece but little affected, if at all unhealthy. Hence results the well known "marbled" appearance of the organ when a section is made of a diseased lung. The diseased organ becomes consolidated, which may easily be proved by placing a piece in a bucket of water; if the lung is diseased and solid, it at once sinks, if not affected or but slightly so it floats.

Native treatment.

The remedies used by cattle owners for this malady seem to have been of little use. Indeed medicine has little control over the disease when once it has gained entrance into the system of an animal.

Saugor.—

1. Kacharia ,,, 1 chittack.
   Bach (Acorus calamus) 1 do.
   Ajwain 1 do.

to be pounded and given in two doses with 2 chittacks of linseed oil for two days. If of no use, cauterize the sides.

2. Chitawar 16 chittacks; pound and give three times daily.
3. Garlic, 4 chittacks.
   Spirit, 10 ounces.

If no purging, repeat the dose.

Hoshangabad.—

1. Ajwain 1 pice weight.
   Ghee, 1 chittack.
   Black pepper, 1 pice.

To be mixed together, and given twice a day. Both sides are cauterized with a hot sickle.

2. The same as above with the white of a hen's egg to drink.

Nimar.—

Bel leaves	...	1 tola.
Mahru bark	...	1 do.
Arwihuldee	...	1 do.
Fowl's dung	...	1 do.
Water	...	2 seers.

Boil and give twice daily.

Nagpur—

1. Alum .. ½ seer.
Lime juice ... ½ seer.

To be given three times a day.

2 Root of Rugnee ... ½ tola.
,, Dotra ... ¼ do.
,, Madar ... ½ do.
Ajwain ... 1 do.
Ajmida ... 1 do.
Kursanee ... 1 do.
Bark of Maharook ... 1 do.
Pepper ... 1 do.

To be mixed and given in spirits twice a day.

3. Moongna bark ... 2 tolas.
Mustard ... 1 do.
Salt ... 1 do.
Tobacco ... 1 do.

To be given in spirits.

4. Bark of Tatu ... 1 tola.
,, Mahaiook ... 1 do
,, Huldia Kachumb ... 1 do.
,, Bhoyee Kokala ... 1 do.

To be given in spirits.

5. Roots of Otrund ... 2 tolas.
,, Tungerda ... 2 do.
,, Datu ... 2 do
Bark of Moharook ... 4 tolas.
,, Rohonee ... 4 do.
6. Bark of Ajwan ... 4 do.
,, Beheda .. 4 do.
,, Babool .. 4 do.

In a pint of butter milk.

7. Brinjal leaves
Tamarind leaves.
Jaggery.
Chillies.
Equal quantities in spirits.

Chanda.—

Roots of Ootrur	...	1 tola.
,, Terwan	...	1 do.
,, Ajwain	...	1 do.
,, Garlic	...	1 do.

Mix, and give with water.

Bhandara.—

Ramkully dhan	...	½ seer.
Kawada leaves	...	1 tola.
Water	...	10 ounces.

Treatment recommended.

It has been found in England that treatment, comparatively speaking, is of little use when an animal is affected with contagious Pleuropneumonia. But as many cases of inflammation and congestion of the lungs or its membranous covering will come under the notice of cattle owners in these Provinces which may be mistaken for the contagious disorder, I will give a few directions which will often be found to afford relief. In a country where the great majority of the inhabitants are composed of a class whose religion will not allow of their destroying bullocks or buffaloes, it would be absurd to indicate this mode of partially retrieving the original loss, by destroying the animal and selling it for food. It seems to have been proved almost conclusively that the meat, except in the advanced stage of the disease, is quite fit for human consumption; of course care must be taken that the flesh has been properly cooked. The milk also has been consumed freely, without any ill effects resulting. There seems then no true reason, except caste prejudice, why the flesh and milk should not be utilized. In the early stages when febrile symptoms are present give salt-petre (Shora) one tola in one seer of congee three times a day. To relieve the cough

in the early stages take the root of Gung-ka-Jhar, (Abrus precatorius,) 4 tolas, and boil in a seer of water. Give the liquor of this infusion twice a day for three or four days. At this early stage I cannot too strongly recommend fumigation. Every care should be bestowed upon the patients and cleanliness insisted upon.

If the animal is constipated give the following in the form of a draught:—

Common salt	...	3 chittacks.
Ginger	...	½ chittack.
Jaggery	..	2 chittacks.

—well mixed in 2 seers of water.

—or Linseed oil ... ½ seer,

may often be given with great benefit. A blister should be applied on both sides of the chest if both lungs are affected, to one, of course, if only one side is diseased, consisting of croton oil, 1 part, and cocoanut or any other bland oil, 3 parts. This acts as a counter-irritant, and is often found to be a remedy of great value in disorders of the chest : a milder blister is made by pounding mustard seed and mixing it into a paste with hot water. After the fever has subsided the strength must be kept up with tonics and nutritious food, and no better drug of this class can be given than Sulphate of iron (Hirakasis) 1 tola powdered and given in conjee twice a day, or a decoction of chiretta 2 chittacks, likewise to be given twice a day. The decoction is made by boiling 1 seer of chiretta stalks (previously chopped small) in 5 seers of water. The fluid is then strained, and dose, as above prescribed, given. The preventive measures I would advise, are precisely similar to those already mentioned.

KAMPTEE.
March 1885.

W. D. GUNN,
Army Veterinary Dept.

APPENDIX A

Drugs used in the Central Provinces for Cattle diseases.

Vernacular Names.	Botanical Names.	Medical Properties.
Agya ...	Andropogon schœnanthus ..	Externally—a stimulant. Internally—used for intermittent fevers.
Ajwain ...	Ptychotis ajowan ...	Stimulant, carminative and is frequently used for allaying abdominal pain.
Akhan ...	Calotropis gigantea ...	Externally—used for cutaneous affections. Internally—purgative.
Akol ...	Alangium hexapetalum ...	Purgative, and used for expelling internal parasites. It is also supposed to be an antidote to snake bites.
Ambihaldi ...	Curcuma zeodaria ...	Tonic and carminative; used by the natives in disease of the kidneys.
Amrabayawam ...	Viburnum grandiflorum ...	Not known.
Andachari ...	Cucumis utilissimus ...	Internally—used for expelling tapeworms.
Arni ...	Premna integrifolia ..	Stimulant.
Asgund ...	Withania somnifera ...	Diuretic—The roots and leaves are powerfully narcotic.
Babul ...	Acacia arabica ...	Astringent. The gum is an excellent mucilage.

APPENDIX A.

Vernacular Names.	Botanical Names.	Medical Properties.
Bach ..	Acorus calamus ..	Aromatic—supposed to be anantidote to several poisons, and is sometimes eaten as a preventive to epidemic diseases.
Bakkan ..	Cœsalpinia sappan ..	Powerful astringent.
Bawancha ..	Psoralia corylifolia ..	Internally a stomachic. Externally for cutaneous affections.
Bel ..	Œgle marmelos ..	Astringent—the fruit is a specific for dysentery.
Bharoti ..	Andrachne cordifolia ..	The root is given for liver complaints. The young shoots in dysentery. Externally—the leaves are used as a poultice for ulcerations.
Bhilawa ..	Semecarpus anacardium ..	The extract oil is used as a blister: externally also applied for rheumatism and sprains. Internally is a powerful narcotic (should be used with much care).
Bhoi Kokola ...	Trichosanthes cordata ...	Alcoholic extract is an excellent purgative.
Bijasal ..	Pterocarpus marsupium ..	Astringent. Somewhat similar to catechu, but milder in its operations.
Butia ..	Chenapodium album ..	Given by cattle owners with ghee in cases of swollen throat (anthrax).

Chandan	... Santalum album	..	Diaphoretic in fevers. Externally, applied to allay local inflammation.
Chitarah	... Plumbago zeylanica	...	Used in intermittent fevers. Is a powerful soporific.
Damar	... Vateria indica	..	Applied in chronic rheumatism.
Datu	... Datura alba	..	Powerful narcotic.
Dewada	... Sethia indica	..	Internally—tonic. Externally—refrigerant.
Dhamni Khamni	... Grewia oppositifolia	..	Stimulant.
Dhatuni	... Baliospermum montanum	...	Carthatic: the leaves are an excellent application for wounds.
Dhurpulas	... Grislea tomentosa	..	Astringent.
Dikamali	... Gardenia gummifera	...	An excellent stimulant to wounds and has the advantage of keeping away flies.
Ghus	... *See Agya*	...	
Gugal	... Balsamodendrum agallocha	..	Similar to bdellium.
Haldi	... Curcuma longa	...	Cordial and stomachic.
Hasjura	... Vitis quadrangularis	...	Stimulant to unhealthy ulcers.
Hunia Kaddu	... Lagenaria vulgaris	..	Aperient.

APPENDIX A.

Vernacular Names.	Botanical Names.	Medical Properties.
Indrawan ..	*See Keri* ..	
Isia ...	*See Asgund* ...	
Kakri ..	*See Andachari* ...	
Kaith ..	Feronia elephantum ...	Astringent.
Kassum ..	Schleichera trijuga ...	Astringent. also used for skin disease.
Katar Sal ..	Shorea robusta ...	Stimulant to unhealthy wounds.
Kattha ...	Acacia catechu ...	Astringent.
Keri ...	Ligustrum robustum ...	Stimulant to wounds.
Kukura ...	Curcuma zeodaria ...	Tonic and carminative.
Kurchi Khund ..	Wrightia tinctoria ...	
Kuru ...	Citrullus colocynthus ...	Carthatic.
Lavu ..	Lagenaria vulgaris ...	Aperient.
Lingara ...	*See Agya* ...	
Madar ..	*See Akhan* ..	

Mahanimb	Cedrela toona	Powerful astringent, used for cases of dysentery.
Mahonli	Bauhinia racemosa	Not known.
Manga	Moringa pterygosperma	Stimulant in paralysis and intermittent fever.
Nilpi aunlah	Phyllanthus emblica	Diuretic.
Paud	Viscum articulatum	Narcotic (It is a vegetable parasite which grows on trees.
Pariakhan	*See Akhan*	
Passi	Dalbergia paniculata	Stomachic; externally applied for skin disease.
Phepsus Kanda	Rhamnus virgata	Stimulant.
Pipal bark	Ficus religiosa	Alterative and purgative.
Randarah Rungashuk	Amaranthus gangetica	Aperient.
Rangara Khund	Acacia leucophlœa	Stimulant.
Rangorhir	Areca gracilis	Astringent.
Rita	Sapindus emarginatus	Expectorant: given in pleuropneumonia.
Rohni or Rohana	Soymida febrifuga	Bark is slightly astringent: given in cases of fever.
Sagurghoti	Ficus excelsa	Powerful aperient (decoction of the root).
Sanduri	*See Dhurpulas*	

APPENDIX A.

Vernacular Names.	Botanical Names.	Medical Properties.
Sasum morli ...	Asparagus racemosa ...	Diuretic and relieves pain in inflammation of the bowels.
Singaree Khund ...	Trapa bispinosa ...	Tonic.
Srindhi ...	*See Dhurpulas* ...	
Suji mitti ...	Carbonate of soda ..	Used in foot and mouth disease for the ulcers.
Supari ...	Areca Catechu ...	Astringent, stomachic: an excellent remedy for tape-worms.
Tambi ...	Lagenaria vulgaris ...	Aperient.
Tarur or Tarwar ...	Cassia auriculata ...	Astringent.
Wasun ...	Andropogon nardus ...	Febrifuge.

APPENDIX B.

A translation of instructions as to Pasteurs' system of inoculation (Quarterly Journal of Veterinary Science in India.)

1. The "vaccinal" liquid or lymph is conveyed to its destination in closely corked tubes, which contain sufficient to inoculate 50, 100, 200, or 300 sheep and goats, or 25, 50, 100 or 150 cattle, buffaloes, or horses. These tubes are labelled "first vaccine," or "second vaccine" A certain quantity of this liquid must be inserted under the skin of the animal. This can be done with a Pravary syringe, such as is used by Doctors and Veterinary Surgeons to make injections under the skin of man and the domesticated animals. First, the syringe most be filled with the liquid. For this the small metallic thread in the needle, which is intended to keep out any foreign substance that might choke it up, must be removed. The needle must then be fixed on the piston tube (cylinder), the vaccine shaken, and the liquid drawn up by slowly raising the piston. If the syringe works well it will be completely filled with liquid and will leave only a very small air bubble under the piston. It frequently happens, however, that the piston is more or less dry, or that the needle does not fit well. Then the liquid does not fill the syringe completely and a very large air bubble is found under the piston. In this case by repeating the process two or three times, the piston will be moistered, and if the needle fits well the syringe will be filled completely. *It is indispensible that this condition be attained.*

2. If however owing to any accident the piston should be too dry and allow the air to escape it should be boiled in water and left to cool in the vessel in which it was boiled until it is lukewarm: then the syringe must be filled two or three times with this water to swell the piston. *Water which has never been boiled must not be used for this purpose.*

3. If the water passes above the piston it is a sign that it is bad, and will have to be changed. If one piston only is at the disposal of the operator, it must be tightened a little with the small key which is in the box of the syringe.

4. *Sheep and goats.*—When the syringe is quite full, the little brass marker which is on the stem of the piston must be placed at the division marked 1. An Assistant must then take hold of the animal which is to be imoculated, and hold it firmly by its fore-legs in the required position. The operator then must insert his needle under the skin in the middle of the *right* thigh, and push the piston until the marker touches the syringe. The inoculation of the first animal is then complete. The syringe is drawn back. The brass marker is placed at the division marked 2 on the stem of the piston, and the second animal is operated upon; and so on, each syringe holding

enough to inoculate eight. When empty, the syringe must be filled up again in the same way as before. With a little practice, a man would soon be able to inoculate 150 sheep per hour. Twelve or fourteen days after the first operation the process must be repeated with the second vaccine; but this time the injection must be made in the *left* thigh of the animal,—that is, in the one which has not been already operated upon.

5. *Horses, &c.*—The same fluid which is used for sheep and goats may be taken for cattle, horses, asses, and mules; but a double dose will be needed for the larger animals—that is to say, the small brass marker must be placed at the division 2 for the first operation; afterwards it may be put at 4, and then at 6 &c., each syringe containing enough lymph to inoculate 4 of the larger, instead of 8 of the smaller animals. Instead of injecting the lymph into the thigh, it should be put behind the shoulder for cattle, and in the neck of the horse, ass, and mule, care being taken to place it where the collar will not press upon the marks.

6. The skin of large animals is very difficult to pierce with a needle; care must be taken, therefore, to make the puncture in an exact line with the syringe, to avoid a bruise. It is a good plan also to make a small fold of skin with the left hand, by way of facilitating the introduction of the needle. The same needle which has been used for sheep should not be used for the larger animals, and for safety's sake, a stronger needle for operating on them is put into the box with the syringe.

7. It is most important that the vaccinal liquid should be in a condition of *perfect purity* when it is injected under the skin. If it be impure, that is to say, if it be contaminated by water which has not been boiled, or by dust, or other foreign substance, there would be injected into the animal, not only the mild virus, but other organisms, possibly those of erysipelas or lepticosmia, (for example), which might give another disease, or the inoculation might be hindered. *The liquid as sent is quite pure*, and may be drawn directly into the tube, but it is necessary that the syringe also should be clean. New syringes which have never been used are so, but after they have been employed for one inoculation they should be replaced by fresh ones. *The operation is an exceedingly delicate one*, and the syringe should be repaired and cleaned before it is used again. In a word, a syringe should not be used a second time after some days have elapsed since it was first employed, until it has been thoroughly cleansed.

8. *The lymph should be put as soon as possible in a cellar to keep it cool, and a tube which is open one day should not be employed on the following or succeeding days, consequently the contents of every tube which is opened should be used the same day, and any matter which remains should be rejected without hesitation.*

9. If an operator is pressed for time, or has too many animals to inoculate, so that he works hurriedly there is a danger that his inoculation may be incomplete. The needle may pass over the skin, instead of piercing it, and shoot the vaccine outside; or he may neglect to shift the marker, and from that time he may push the piston but the lymph will not be injected under the skin. Under these circumstances, there is a danger that since the first vaccine may not have been introduced into the system, *the second vaccine, being more active, may cause death.*

10. Great care should also be taken to prevent animals which are being inoculated with the first vaccine from escaping too soon out of the hands of the Assistant who is holding them. They may mingle with the flock or herd, and then by mistake receive an injection of the second vaccine, before they have been partially preserved by the first, and in this way accidents may arise.

11. There is another mischance to be guarded against, namely, that the air in the tube must never be at the needle end. If it were so, the operator might push the piston, but air only, not lymph, would escape, and thus the inoculation would not be accomplished. *This accident is of frequent occurrence.*

12. Cattle and buffaloes have not hitherto exhibited a tumour at the points inoculated. Horses, especially young horses, have sometimes had tumours more or less extensive; but they always subside with tolerable quickness, without any treatment whatever. The experiment of inoculating young horses three times has been made, that is, twice with the first vaccine and once with the second: but not the slightest tumour has been produced. Proofs of this kind continue to increase. It may be that this is the best method of inoculation for these animals.

NOTE.—The cleansing of the instrument must be carried out every time it has been in use.